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(54) Machinery covers

(57) A cover 10 for a machine tool slideway is formed from a flexible outer sheet (e.g. PVC) folded in convoluted fashion to provide

V-shaped valleys having flanks (13a) which are reinforced by strips (14) and there are stiffening ribs (15) in some or all of the valleys, the ribs (15) and strips (14) being formed from a single sheet of relatively rigid plastics material (e.g. polypropylene).

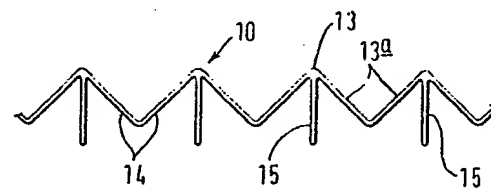
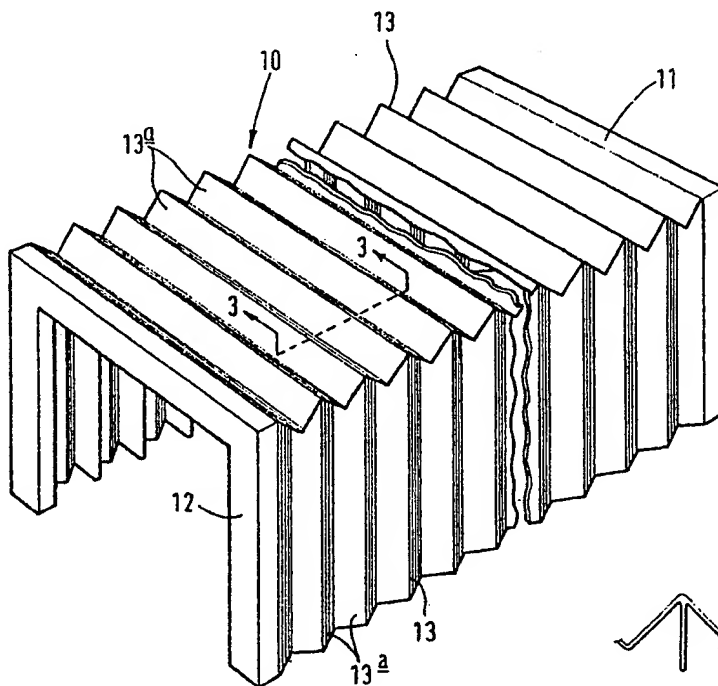


FIG 3

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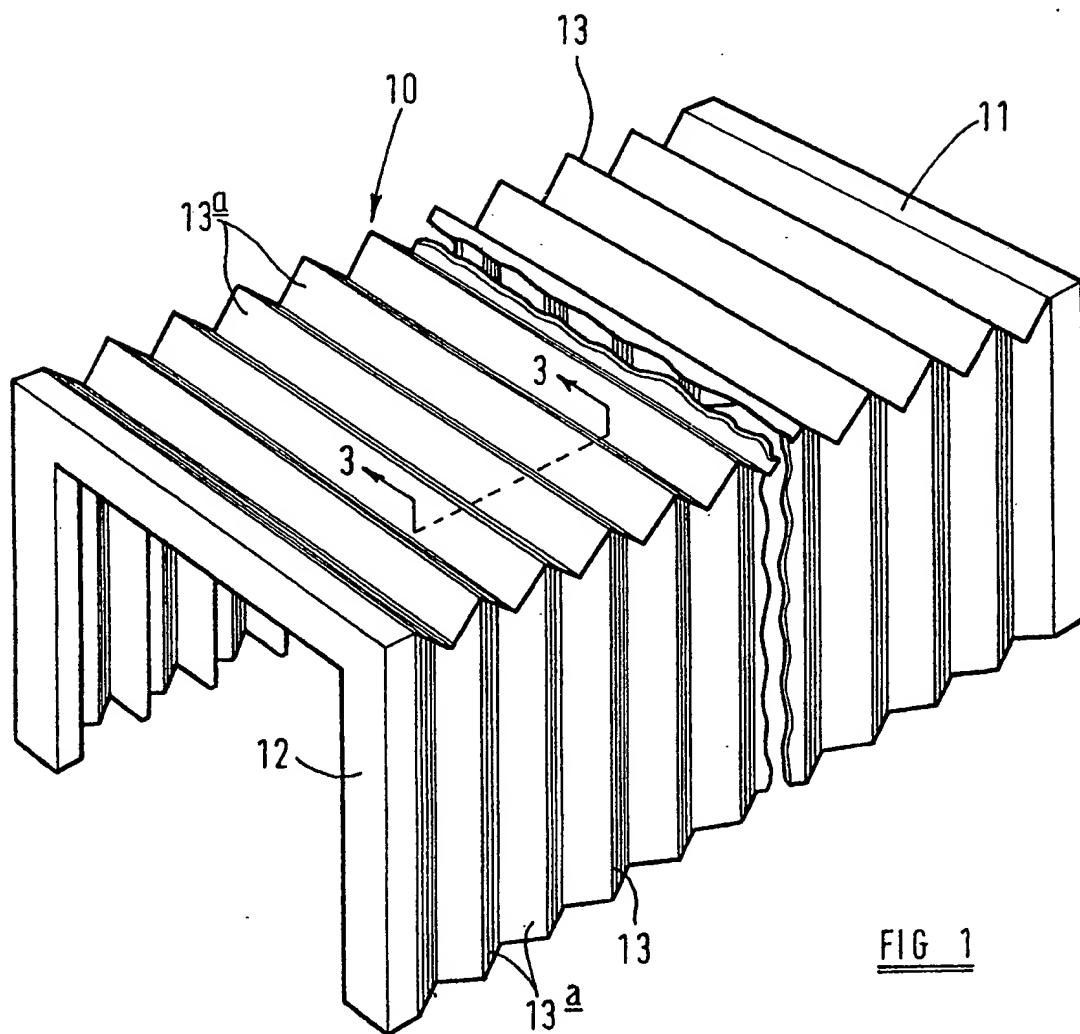


FIG 1

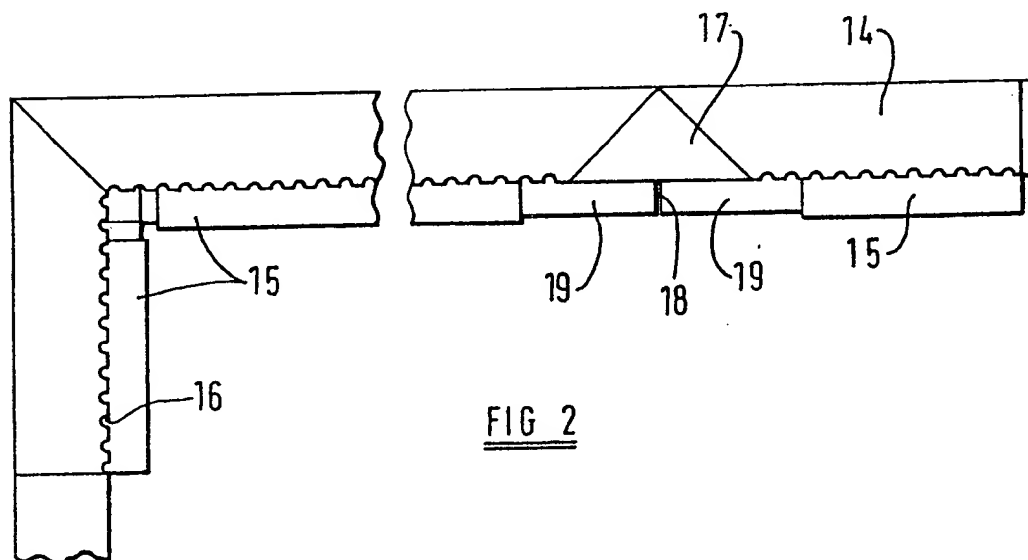
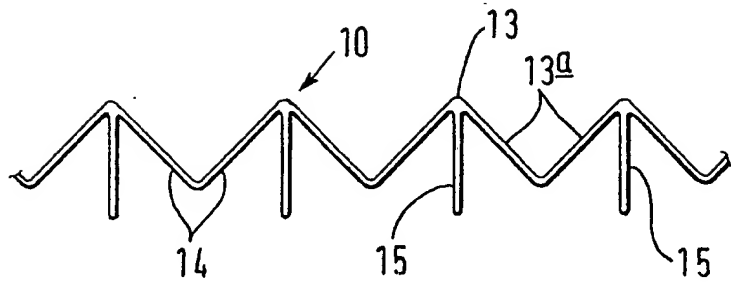
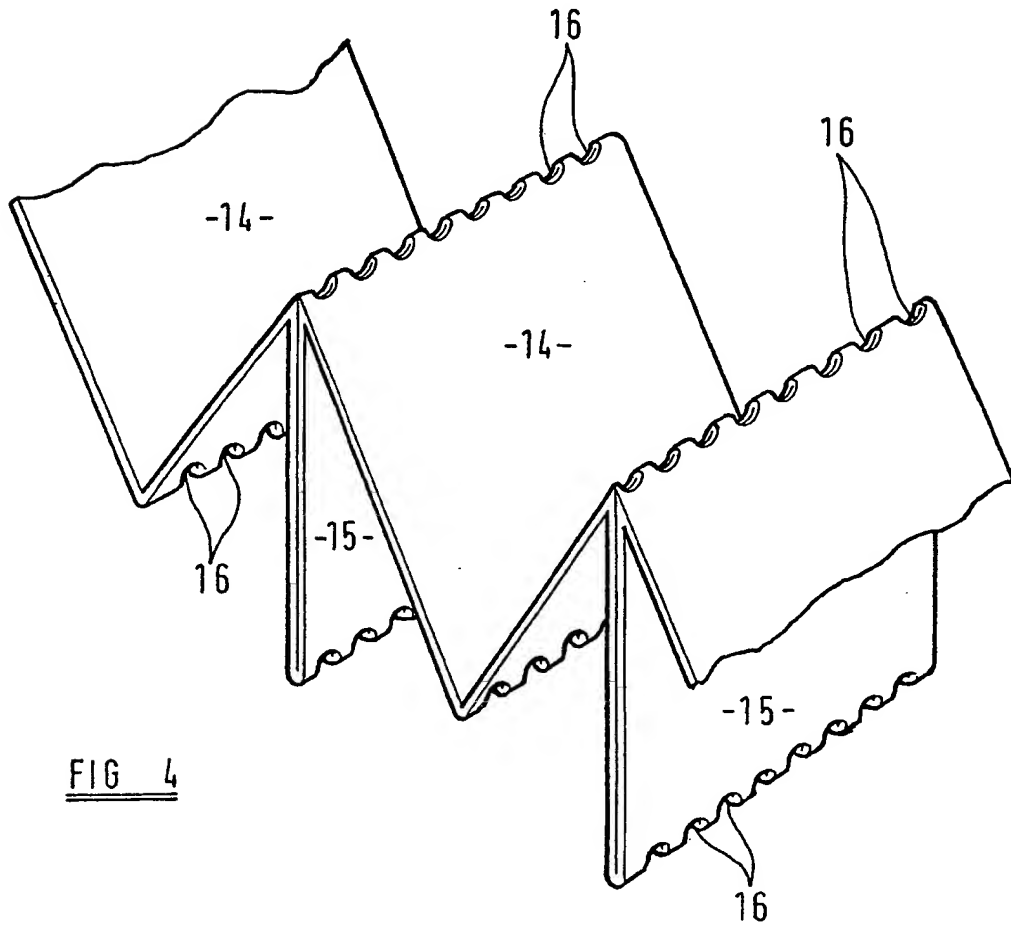


FIG 2

FIG 3FIG 4

SPECIFICATION

Improved machine slideway cover

This invention relates to a cover for the protection of slideways of reciprocating parts of machinery, such cover being of convoluted form, and when in use one end of the cover being connected to a fixed part of the machine associated with the slideway and the other end being connected to a reciprocating part of the machine.

The invention is concerned with the convoluted type of cover formed from flexible sheet or fabric material which is folded concertina fashion along fold lines extending across the cover at right angles to the direction of extension of the cover and wherein the inwardly presented flanks of the folds are reinforced with transversely extending strips of a material which is relatively rigid as compared with the flexible sheet or fabric material. These reinforcing strips are formed as part of one continuous sheet extending from end to end of the cover and having transversely extending lines of weakening or corresponding forms of creasing which act as hinge lines between adjacent reinforcing strips and allow the reinforcing strips to hinge relatively to one another and thus follow the movement of the flanks of the flexible sheet part of the cover. Hereinafter a cover as above described is referred to as "a cover of the type specified".

A problem which arises with this type of cover is that due to resistance to folding, it has a tendency to rise up from the slideway it is protecting during a working stroke where the convolutions are required to close and there have been various proposals to overcome this problem, such as providing positive restraints on the slideway or mechanical inter-engagement between the cover and parts of the slideway.

It has also been proposed to provide separate stiffening ribs in some or all of the convolutions of the cover, each stiffening rib being secured by one longitudinal edge in the apex between two adjacent flanks of the cover so that it is centrally disposed in relation to the two flanks. However, to provide a connection of sufficient strength, each rib has to be stitched to the flexible sheet or fabric part on the cover and this means that the cover is pierced by the holes for the stitching and is therefore liable to allow the passage of water and oils and contaminating materials.

The object of the invention is to provide an improved construction of cover of the type specified which overcomes the above mentioned disadvantages.

According to the invention there is provided a cover of the type specified wherein transversely extending stiffening ribs are provided in some or all of the valleys between adjacent flanks on the inwardly presented side of the cover, the flanks on this side having reinforcing strips which are formed from one continuous sheet with transversely extending lines of weakening which provide fold lines, each stiffening rib being formed from a

transverse section of such sheet which extends between the transversely extending edges of two adjacent opposed reinforcing strips, the said section being folded to double thickness about a central fold line and the two folded parts being secured together in face-to-face relationship to form a stiffening rib located centrally between said opposed reinforcing strips.

The flexible sheet or fabric part of the cover may be a plastic material or a plastic or rubber coated fabric, for example, and the sheet which makes up the reinforcing strips and stiffening ribs may be polypropylene or a similar plastics material, having the properties of being relatively rigid as compared with the flexible sheet for example, yet being sufficiently flexible in thin section to provide a permanent hinge when a hinge line is formed in a sheet by a line of weakening such as a score line or a row of perforations.

The invention is illustrated by way of example in the accompanying drawings wherein:—

FIGURE 1 is a perspective view of a cover for a machine slideway with the cover shown extended;

FIGURE 2 is an end view of a section of the cover showing on the righthand side of the figure a manner of formation of a corner;

FIGURE 3 is a section on the line 3—3 in Figure 1;

FIGURE 4 is a perspective view of a section of the cover omitting the flexible sheet part to show the construction of the reinforcing strips and stiffening ribs.

Figure 1 shows a cover which could be used to protect the slideway of a machine having a part which reciprocates in a generally horizontal plane and comprising a box-type cover generally indicated at 10, connected between end frame members 11 and 12. The invention is not limited to this particular shape and form of cover which may vary in accordance with the particular design of machine which the cover is to protect.

Also in addition to a cover which extends in the horizontal direction, the cover may be arranged so that the cover extends in the vertical direction or in a direction inclined to the vertical, again depending upon the dictates of the machine tool and reciprocating part to which the cover is to be applied.

As shown in Figures 2 and 3, the cover comprises an outer flexible sheet of plastics material such as coated fabric which has a series of transverse fold lines 13 providing a number of inverted V-shaped valleys with flanks 13a, these flanks 13a being strengthened on their inner faces by reinforcing strips 14 and the cover being further strengthened by means of the transversely extending stiffening ribs 15 which, as shown in Figure 3, are provided one to each of the inverted V-shape valleys with the upper edge of the stiffening rib in each case extending along the apex of the valley. A stiffening rib may be provided in each valley as shown or there may be stiffening ribs in only some of the valleys such as in alternate ones.

The cover shown in Figure 1 is known as having "all round continuous folds" and the method of folding used is such that the fold lines 13 extend down each side of the cover and the same applies to the valleys formed between the flanks 13a. The flexible nature of the outer sheet of flexible material enables this folding to take place at the corners but when forming the corners for the reinforcing strips and stiffening ribs 15, a cutting method has to be adopted as described hereinafter.

The reinforcing strips 14 and stiffening ribs 15 are all formed from one continuous sheet of plastics material and the preferred material is polypropylene which has the characteristic of being relatively rigid as compared with the flexible outer sheet but which can flex and follow the movement of the cover by virtue of the lines of weakening as described hereinafter. The continuous sheet of polypropylene is provided with a series of transversely extending lines of weakening which in the example shown take the form of a series of perforations 16 which have the effect of forming a hinge between adjacent reinforcing strips 14 and also between opposed reinforcing strips and the upper edge of the stiffening rib 15 which is between them. Each stiffening rib 15 is formed by taking a section of the polypropylene sheet between two reinforcing strips and bringing the two halves of the section together by folding about the hinge line 16 and then securing these two halves together by suitable adhesive to form a stiffening rib 15 of double the thickness of a reinforcing strip 14. The composite assembly of reinforcing strips 14 and stiffening ribs 15 is then secured to the inner face of the flexible sheet by adhesive bonding of the reinforcing strips 14 to the inner face of the flexible sheet.

As can be seen from Figures 2 and 3, each stiffening rib 15 may be deeper than the corresponding valley which means that, in this case, the breadth of the section of polypropylene sheet from which the stiffening rib 15 is formed is greater than twice the breadth of a reinforcing strip 14.

In forming the corners between the top and the two sides of the cover, the outer flexible sheet is folded in known manner to produce gussets at the corners but the polypropylene material of the strips 14 and ribs 15 requires a different method to form the corners owing to the more rigid nature of this material, this method is shown in the righthand part of Figure 2.

As shown in the righthand part of Figure 2, each reinforcing strip is cut away in the region where the corner is to be formed so as to provide a triangular shaped cut out part 17 where there is no reinforcing strip 14. Also at this region of the corner each stiffening rib is slit across its breadth as shown at 18 and a rectangular portion of one thickness of the rib 15 is removed on each side of the slit 18 thus leaving two single thickness portions of reinforcing rib as indicated at 19 in Figure 2.

The outer part of the cover section can then be folded through a right angle in relation to the horizontal section to provide the downwardly extending side of the cover and it will be understood from Figure 2 that when this 90° bend takes place, the one single thickness part 19 of each stiffening rib moves into face-to-face relationship with the other single thickness part 19 and the two overlapping parts are secured together by suitable adhesive bonding or other means.

The stiffening ribs 15 shown in the drawings have straight edges which define a substantially rectangular opening having vertical sides and a straight horizontal top but this is only by way of example and it will be appreciated that the ribs 15 may have a different profile depending upon the shape and construction of the machine slideway with which the cover is used. For example the edges of the downwardly extending reinforcing strips at the sides of the cover may be inclined to the vertical and may have other than a straight profile and also the sides of the cover themselves may extend at angles other than a right angle to the top part of the cover.

In the case where the included angle at the corner between the top and side of the cover is other than a right angle (e.g. an obtuse angle), the method of forming the corner is substantially the same as described for Figure 2, except that the shape of the cut out parts 17 and 19 would be different from that shown in Figure 2, their shape being dependent upon the size of the included angle.

100 CLAIMS

1. A cover of the type specified wherein transversely extending stiffening ribs are provided in some or all of the valleys between adjacent flanks on the inwardly presented side of the cover, the flanks on this side having reinforcing strips which are formed from one continuous sheet with transversely extending lines of weakening which provide fold lines, each stiffening rib being formed from a transverse section of such sheet which extends between the transversely extending edges of two adjacent opposed reinforcing strips, the said section being folded to double thickness about a central fold line and the two folded parts being secured together in face-to-face relationship to form a stiffening rib located centrally between said opposed reinforcing strips.

2. A cover according to Claim 1 wherein the composite assembly of reinforcing strips and stiffening ribs is formed from a single sheet of polypropylene.

3. A cover according to Claim 1 or Claim 2 wherein the fold lines between each reinforcing strip and the strip to which it is directly connected is formed by a row of perforations extending transversely across the sheet from which the strips are formed.

4. A cover according to Claim 3 wherein the fold lines between each stiffening rib and the two

reinforcing strips to which it is directly connected are each formed by a row of perforations extending transversely across the sheet from which the strips are formed.

- 5 5. A cover according to any one of the preceding claims having a central part and a side extending at an angle from each longitudinal edge of the central part, the corner between the central part and each side being formed by removing an

- 10 appropriate area of each reinforcing strip at the position of the corner, slitting each stiffening rib across its breadth at said position and removing a single thickness of rib from each side of the slit to allow the remaining parts to engage in face-to-face relationship when the corner is formed.

- 15 6. A cover for a machine slideway substantially as herein described with reference to and as shown in the accompanying drawings.